

36596A

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	
	:	
Albert LEBL	:	Patent Art Unit: 1754
	:	
Serial No.: <i>Divisional of 09/129,212</i>	:	Examiner: J. Strickland
	:	
Filed: Herewith	:	
	:	
For: PROCESS AND APPARATUS FOR THE	:	
EXTRACTION AND REGENERATION	:	
OF ACIDS FROM SPENT ACIDS	:	

**PRELIMINARY AMENDMENT**

Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as follows.

**IN THE SPECIFICATION:**

On page 1, line 1, insert -- This application is a divisional application of Serial No.  
09/129,212, filed August 5, 1998. --

**IN THE CLAIMS:**

Please cancel claims 1-25 without prejudice.

Please insert claims 26-57 as follows.

-- 26. An apparatus for use in regenerating spent acid liquor, comprising:

a primary roasting furnace having a spent acid liquor inlet, a heating device for  
heating spent acid liquor in said primary roasting furnace to a temperature to evaporate a  
liquid portion and to produce acid vapors and a partially roasted metal salt, said primary

roasting furnace further having a first outlet for discharging acid vapors, and a second outlet for discharging partially roasted metal salt; and

a secondary roasting chamber having an inlet for receiving said partially roasted metal salt, a heating device for heating said secondary roasting chamber to a secondary roasting temperature sufficient to oxidize said metal salt substantially to a metal oxide and to separate acid residues from said metal salt, and having an outlet for said acid vapors and metal oxide.

27. The apparatus of claim 26, further comprising a member for partially closing said second outlet in said primary roasting furnace to define an evaporation zone in said primary roasting furnace that is separate from a secondary roasting zone in said secondary roasting chamber.

28. The apparatus of claim 26, wherein said heating device for said secondary roasting chamber includes a hollow ring and a burner device for passing hot combustion gases through said ring.

29. The apparatus of claim 28, wherein said ring is substantially concentric with said second outlet in said primary roasting furnace.

30. The apparatus of claim 26, wherein said primary roasting furnace is a spray roasting furnace.

31. The apparatus of claim 26, wherein said secondary roasting chamber comprises an outlet, a rake and a motor drive device for moving said rake to mix and convey metal salt toward said outlet in said secondary roasting chamber.

32. The apparatus of claim 31, wherein said rake comprises a support member with a longitudinal dimension and having a plurality of blades fixed to said support member at an angle with respect to said longitudinal dimension, and said motor drive device is coupled to said support member for rotating said rake about a central axis with respect to said secondary heating chamber to mix and convey metal salt from said center axis toward said outlet in said secondary roasting chamber.

33. The apparatus of claim 31, wherein said rake is a rabble rake.

34. The apparatus of claim 26, wherein said secondary roasting chamber comprises an inlet for feeding reducing gas into said secondary roasting chamber.

35. The apparatus of claim 34, wherein said reducing gas is selected from the group consisting of hydrogen, water vapor, methane, carbon monoxide, and mixtures thereof.

36. The apparatus of claim 26, wherein said primary roasting furnace includes a frustoconical bottom wall and wherein said second outlet is at an apex of said bottom wall.

37. The apparatus of claim 36, further comprising a rotatable cone member positioned in said second outlet of said primary roasting furnace defining an annular gap for

reducing a particle size of partially roasted metal salt discharged to said secondary roasting chamber.

38. The apparatus of claim 37, wherein said bottom wall of said primary roasting furnace includes an annular wall surrounding said second outlet and wherein said cone member includes a cylindrical side wall cooperating with said annular wall.

39. The apparatus of claim 26, wherein said heating device of said primary roasting furnace feeds hot gases tangentially into said primary roasting furnace.

40. A spray roasting apparatus for use in regenerating spent acid liquor, said spray roasting apparatus comprising:

a primary roasting furnace having a liquid spray inlet for spraying spent acid liquor into said primary roasting furnace, a heating device coupled to said furnace for heating spent acid liquor to a temperature sufficient to evaporate a liquid portion and produce acid vapors and to produce a partially roasted metal salt, a first outlet for discharging acid vapors, and a second outlet for discharging partially roasted metal salt; and

a secondary roasting chamber coupled to said primary roasting furnace and having an inlet dimensioned for receiving partially roasted metal salt from said second outlet of said primary roasting furnace, a second heating device for heating said secondary roasting chamber to a secondary roasting temperature sufficient to oxidize a metal salt substantially to a metal oxide and to separate acid residues from the metal salt, and an outlet dimensioned for discharging acid vapors, and for discharging metal oxide from said secondary roasting chamber.

41. The apparatus of claim 40, further comprising a closure member positioned in and partially closing said second outlet in said primary roasting furnace to define an evaporation zone in said primary roasting furnace and a secondary roasting zone in said secondary roasting chamber.

42. The apparatus of claim 40, wherein said second heating device for said secondary roasting chamber includes a hollow annular ring and a burner device coupled to said ring for directing hot combustion gases through said ring.

43. The apparatus of claim 42, wherein said ring is substantially concentric with said second outlet in said primary roasting furnace and said inlet in said secondary roasting chamber.

44. The apparatus of claim 40, wherein said secondary roasting chamber comprises a rake and a motor drive device for moving said rake to mix and convey metal salt in said secondary roasting chamber to said outlet of said secondary roasting chamber.

45. The apparatus of claim 44, wherein said rake comprises a support member with a longitudinal dimension and having a plurality of blades fixed to said support member at an angle with respect to said longitudinal dimension, and said motor drive device is coupled to said support member for rotating said rake about a central axis with respect to said secondary heating chamber to mix and convey metal salt from said center axis toward said outlet in said secondary roasting chamber.

46. The apparatus of claim 44, wherein said rake is a rabble rake.

47. The apparatus of claim 40, wherein said secondary roasting chamber comprises a reducing gas supply and a gas inlet for feeding said reducing gas into said secondary roasting chamber.

48. A spray roasting reactor comprising:

- a reactor housing defining a primary roasting zone and having a liquid inlet for feeding a liquid into said primary roasting zone, a heating device for heating said primary roasting zone to a temperature for roasting spent acid liquor, and a bottom wall with a discharge opening;
- a rotatable cone member positioned in said discharge opening, said cone member having a substantially frustoconical portion positioned adjacent said opening to define an annular gap therebetween;
- a drive device for rotating said cone member whereby said cone member reduces the size of particulates produced during roasting of the spent acid while passing between said cone member and said opening of said bottom wall; and
- a secondary roasting chamber separated from said primary roasting zone by said rotatable cone member.

49. The reactor of claim 48, wherein said cone member includes a cylindrical side wall having a plurality of ribs for reducing the size of particles passing between said cone and opening in said bottom wall.

50. The reactor of claim 49, wherein said bottom wall of said primary roasting zone has a frustoconical shape converging to said discharge opening.

51. The reactor of claim 48, wherein said reactor housing includes an annular collar extending axially from said discharge opening cooperating with said cylindrical side wall of said cone member.

52. The reactor of claim 48, wherein said liquid inlet is a spray nozzle.

53. The reactor of claim 48, further comprising a rotating rake for mixing particulates in said secondary roasting chamber and conveying said particulates to a discharge opening, wherein said rake is coupled to said drive device for rotating simultaneously with said cone member.

54. The reactor of claim 48, further comprising an annular wall extending from said bottom wall of said reactor housing and surrounding said discharge opening, said annular wall enclosing said secondary roasting chamber.

55. The reactor of claim 54, further comprising a hollow, annular heating member in said secondary roasting chamber surrounding said discharge opening in said bottom wall of said reactor housing.

56. The reactor of claim 55, wherein said annular heating member is above said discharge opening in said bottom wall of said reactor housing. --

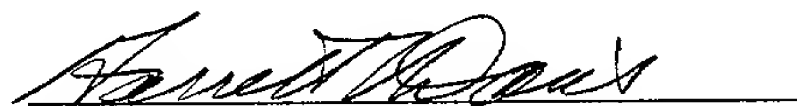
#### REMARKS

This application is a divisional application of prior application Serial No. 09/129,212.

The present amendment cancels the original claims 1-25, and introduces new claims 26-56 directed to the apparatus. The pending claims in this application are claims 26-56, with claims 26, 40 and 48 being independent.

Prompt and favorable examination is requested.

Respectfully submitted,



Garrett V. Davis

Reg. No. 32,023

Roylance, Abrams, Berdo & Goodman, L.L.P.  
1300 19<sup>th</sup> Street, N.W., Suite 600  
Washington, D.C. 20036  
(202) 659-9076

Dated: Jan 5, 2001